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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
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EXAMINER
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ART UNIT	PAPER NUMBER
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10  
DATE MAILED: 09/25/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

**Office Action Summary**

Application No.

09/623,414

Applicant(s)

COSTANTINI ET AL.

Examiner

Mahreen Chaudhry

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on Amendment file 2 July 2001.
- 2a) ☒ This action is **FINAL**.                      2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All   b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)                      4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)                      5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) \_\_\_\_\_                      6) ☐ Other: \_\_\_\_\_

## DETAILED ACTION

### *Status of the claims*

1. Acknowledgement is made of the amendment filed July 2, 2001. Claims 1, 5, 12, 14 and 15 have been amended.

### *Claim Rejections - 35 USC § 103*

2. The text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

Claims 1-10, 13-15 and 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 5,900,506 issued to Fache et al. filed in December 1997 in view of BE 855237A. Fache et al. disclose a process for treating a reaction mixture obtained by direct oxidation of cyclohexane to adipic acid by molecular oxygen in an aliphatic carboxylic acid in the presence of a catalyst containing cobalt (Column 1 Lines 47+). Fache et al. disclose that the reaction mixture settles into two liquid phases in which the upper phase comprises cyclohexane and the lower phase comprises the diacids formed, the catalyst, the solvent and other reaction products (Column 2, Lines 32-38). Fache et al. further teach that the cyclohexane phase obtained after settling may be reintroduced in the cyclohexane oxidation operation (Column 2, Lines 39-41). Fache et al. further disclose distillation of the lower phase at a temperature between 25°C and 250°C and at a pressure between 10 Pa and atmospheric pressure such that the cyclohexane and the solvent are separated from adipic acid (Column 2, Lines 3-6; Lines 44-45). Fache et al. additionally teach the separation of the catalyst by liquid-liquid extraction using cyclohexane or

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by membrane electrodialysis (Column 2, Lines 64-67; Column 3, Lines 1-11, 43-47). Fache et al. also disclose that adipic acid may be crystallized and recrystallized from the aqueous solution (Column 3, Lines 30-35).

Fache et al. do not specifically disclose conducting a reducing or oxidizing purification treatment of the adipic acid in aqueous solution. However, purification of adipic acid by both reducing and oxidizing treatments are well-known. BE 855237A discloses a process for the purification of adipic acid by the addition of 40-65% nitric acid at a temperature between 100 and 140°C in the presence of copper catalysts. BE 855237A further discloses that this purification may be followed by treatment with activated carbon. It would therefore have been obvious to one having ordinary skill in the art to have treated the reaction mixture according to the process of Fache et al. in order to remove the catalyst, side products and reaction products and to have treated the adipic acid with nitric acid and activated carbon before crystallization in order to have further increased the purity of the desired product.

8. Claims 16-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fache et al. in view of BE 855237A as applied to claims 1-10, 13-15 and 19-20 above, and further in view of both JP 71002802B and JP 81006975B. BE 855237A teaches a method for the purification of adipic acid by treatment of nitric acid but does not expressly disclose the purification of adipic acid by oxidation. However, oxidation treatment using oxygen containing gases or hydroperoxides are known methods for the purification of adipic acid. JP 71002802B discloses a process for the purification of adipic acid by treatment with an oxygen containing gas, preferably air. JP 81006975 discloses the purification of adipic acid by the addition of hydrogen peroxide.

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It would therefore have been obvious to one having ordinary skill in the art to have purified adipic acid according to the method of Fache et al. and to have further purified adipic acid using known methods including oxidation with either air or hydrogen peroxide. In addition, it would have been obvious to have conducted the oxidation using any appropriate catalyst.

9. Claims 11-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Fache et al. in view of BE 855237A as applied to claims 1-10, 13-15 and 19-20 above, and further in view of U.S. Patent 3,933,930 issued to Dougherty et al. Neither Fache et al. nor BE 855237A discloses the purification of adipic acid by hydrogenation. However, Dougherty et al. disclose the hydrogenation of a reaction mixture containing adipic acid in order to remove impurities (Column 7, Lines 10-44). Dougherty et al. teach that hydrogenation is conducted using hydrogen and catalysts such as platinum, palladium and cobalt (Column 7, Lines 49-52). It would therefore have been obvious to one having ordinary skill in the art to have treated the adipic acid reaction mixture according to the method of Fache et al. and to have further purified the adipic acid using known purification methods including hydrogenation, as taught by Dougherty et al.

10. Applicant argues that Fache et al. cannot be properly combined with BE 855237A since the reaction mixture obtained by BE 855237A is obtained by the oxidation of cyclohexane with nitric acid whereas the reaction mixture obtained by Fache et al. is obtained by the oxidation of cyclohexane by oxygen. Applicant further argues that since the reaction mixtures are different in that they contain different impurities and catalysts, it would not have been obvious to have

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combined Fache et al. with BE 855237A. However, both the direct oxidation of cyclohexane to adipic acid and the purification of adipic acid containing reaction mixtures by reducing and oxidizing treatments are well-known. BE 855237A teaches a method for the purification of adipic acid from an aqueous reaction mixture by treatment with nitric acid for the removal of colored impurities. JP 71002802B discloses a method for the purification of an aqueous solution of adipic acid obtained by direct oxidation by oxidation treatment with an oxygen containing gas. JP 81006975B discloses a method for the purification of an aqueous solution of adipic acid by oxidation treatment with hydrogen peroxide. Dougherty et al. disclose a method for the purification of adipic acid by hydrogenation treatment. Thus, the purification of aqueous reaction mixtures containing adipic acid by oxidation or reduction treatment is well-known in the art. Fache et al. teaches separation of the reaction mixture in two liquid phases, distillation, separation of the catalyst, crystallization and recrystallization of adipic acid as recited in the instant claims. Applicant indicates that Fache et al. does not disclose each of the features of the instant invention since Fache et al. does not teach purification by oxidation or reduction treatments. However, as discussed above, purification of adipic acid from aqueous reaction mixture by oxidation and reduction treatments are well-known in the art. It would certainly have been obvious to one having ordinary skill in the art to have purified adipic acid according to the purification method taught by Fache et al. and to have included an additional known purification step of oxidation or reduction in order to further increase the purity of the obtained adipic acid.

**THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahreen Chaudhry whose telephone number is (703) 605-1200. The examiner can normally be reached on Monday – Friday (8:30-5:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gary Geist, can be reached on (703) 308-1701 . The official fax phone number for the organization where this application is proceeding or assigned is (703) 308-4556 or 308-4242.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-1235.

mc  
September 17, 2001

  
GARY GEIST  
SUPERVISORY PATENT EXAMINER  
TECH CENTER 1600